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ABSTRACT

This manual for the Portland (Oregon) Public Schools presents basic information on providing educational services to children with traumatic brain injury (TBI). Individual sections cover the following topics: the brain, central nervous system and behavior; physical, psychological and emotional implication; traumatic brain injury in children versus adults; a proposed federal definition of TBI; incidence of traumatic brain injury; rehabilitation; typical recovery sequence following TBI; school reentry; serving the student with TBI; teaching strategies summary; school psychologists and the assessment of TBI (including a table of measures sensitive to neuropsychological domains); educational needs of the student with TBI; designing the individualized educational program; modifying the education environment; modifying the elementary classroom; and modifying the secondary classroom. A glossary defines 20 terms and a resource list identifies eight national, state, or local organizational resources. Appendices include a proposed bill of rights for the brain injured, 3 different coma assessment scales, 16 references, and neurological diagrams. (DB)

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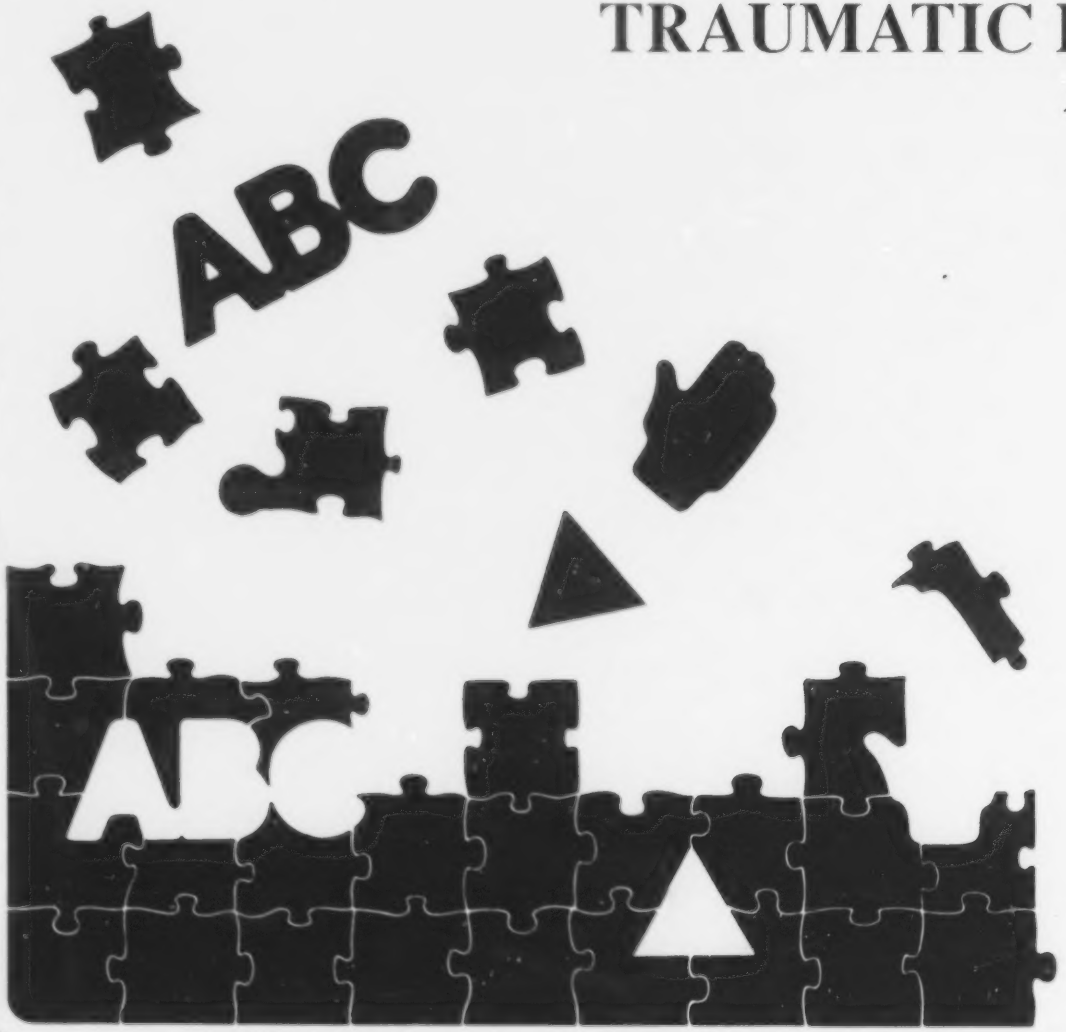
TRAUMATIC BRAIN INJURY

An Educator's Manual



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TRAUMATIC BRAIN INJURY

An educator's manual

1991

A cooperative effort of

Portland Public Schools
Department of Special Education,

Penny R. Reed, Ph. D., State Coordinator
Regional Services for Students with
Severe Orthopedic Impairments

and the

Oregon Department of Education
Office of Special Education
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This manual was originally produced in 1988 for the Portland Public Schools. It was the product of a committee addressing the needs of the traumatically brain-injured. The contributors, authors and synthesizers are listed as:

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THE BRAIN, CENTRAL NERVOUS SYSTEM AND BEHAVIOR

The brain and other parts of the nervous system work together to regulate all behavior through the initiation and inhibition of muscle movement. Understanding the effect of brain injury rests upon comprehension of the normal operation of the central nervous system. In this manual the term "sensation" refers to information-bearing impulses traveling toward the brain, while the term "motor" or "movement" refers to impulses traveling away from the brain and towards muscles. This section of the manual describes the central nervous system components, how these components work together, and their effect upon behavior.

Components of the Central Nervous System

The term "central nervous system" (CNS) refers to the brain and the nerves in the spinal cord. The CNS connects to other nerves, some of which extend to the periphery of the body, the peripheral nerves, and some which extend to the interior of the body, the autonomic nerves. The brain is part of a network of interconnecting nerves.

Further, there is a complex interconnecting network of nerve cells within the brain itself. One may think of the brain as being somewhat spherical in structure with billions of nerve cells backed into the sphere. Looking from the front, one would see that it is divided into two halves, or hemispheres. The outermost surface of each hemisphere is called the cerebral cortex and consists of groups of cells which are sometimes called gray matter and have been grouped into four lobes; frontal, parietal, temporal, and occipital. The temporal lobe contains an area which enables one to understand language, the occipital lobe cells enable one to organize what is seen, and the frontal lobe enables one to plan movements and respond emotionally to the environment. In addition, there are numerous smaller areas of specialization within each lobe.

These areas would be of little use except for the connective tissues which lie below the surface. Sometimes called deep gray matter, these bands of cells make it possible for the lobes of the cortex to do three things: 1. communicate from lobe-to-lobe, 2. organize visual stimuli in the occipital lobe and 3. at the same time, compare what is seen to the auditory stimuli which is being received in the temporal lobe, while planning a movement and an emotional response in the frontal lobe.

In addition to the connective tissue which forms a network between lobes, the brain contains connective tissues that enable one brain hemisphere to communicate with the other. This enables a person to receive words in the left hemisphere and match them with visual memories, which seem to be in the right hemisphere.

Thus, within the brain itself is a complex interlocking network of connective and initiating tissue, allowing each side of the brain to communicate within itself and across to various parts of the other side. This network is connected to the nerve cell network in the spinal cord and peripheral nerves noted above. In the brain stem and cerebellum one finds the connecting points that make it possible for the brain network to interact with the spinal cord network.

In addition to these structural considerations, one must understand that nerve cells must be continually bathed in oxygen and receive nutrition to remain alive and functional. The blood stream supplies the oxygen and nutrition. Unlike other bodily systems, the nervous system cannot replace damaged or dead cells. Thus, nerve cells are highly sensitive to any interruption in oxygen or nutrition supply.

The brain is a complex interlocking network.

Function of the Central Nervous System

The interconnecting network of nerve cells enables the CNS to regulate all behavior. It provides pathways for the brain to receive information from both the exterior and interior of the body, and to generate movement. Some of

The structure of the CNS enables it to perform its regulatory function at a variety of levels within the spinal cord and brain.

In general, the higher order movement patterns are the most modifiable but the slowest to occur, and the reflexes are the least modifiable but the fastest to occur.

this movement is observable (e.g., movement of the arms, legs, trunk, or head). Some of this movement is not readily observable, (e.g., the muscular action in digestion of food).

Multiple Levels and Channels for Ascending Sensory and Descending Motor Impulses

It is important to understand that the structure of the CNS enables it to perform its regulatory function at a variety of levels within the spinal cord and brain. These levels rise to an incredible variety in both the complexity, modifiability and speed of movement. Simply stated, the CNS receives sensations from sensory end organs and transmits these sensations upward along the spinal cord toward various levels in the brain and then generates muscle movement in response to these sensations. Not all impulses travel to the higher levels of the brain. Thus, when one feels tired, one might change position without thinking. Further, upon hearing another person speak, one receives the sound waves of the speech through the ear, processes that language through the brain and decides what, if any, response to give.

As the sensory input rises in the CNS, traveling toward the brain, it stimulates other nerve cells within the CNS. This gives rise to multiple channels. Some of these channels reach all the way to the part of the brain -- the cerebral cortex -- which deals with reflective thought and creative application of knowledge through novel arrangements of information. Some of these channels reach only lower parts of the brain that govern the highly routine activities requiring voluntary action in association with rapidly changing sensory input, such as walking and speaking.

Some of these channels lead to the cerebellum, which governs the coordination of all movement patterns that are modifiable, voluntary or automatic. Some of these ascending sensory channels do not reach the brain at all, but stop at the spinal cord and result in simple but speedy movements sometimes known as reflexes. In general, the higher order movement patterns are the most modifiable but the slowest to occur, and the reflexes are the least modifiable but the fastest to occur.

Simultaneous Functions of Levels and Channels

Thus, the CNS operates with multiple channels of ascending sensory input that can stimulate muscle movement at several points in the ascending pathways, resulting in complex movement patterns. It is important to note that these multiple channels of ascending sensation occur simultaneously, or nearly so, giving rise to complex combinations of movements that vary in speed and can be modified during a given activity. Thus, a student responding to a teacher's question may shift his/her posture and even move the entire body and gesture, all the while talking and, simultaneously, formulating sentences to be stated later.

Association, Discrimination, and Memory

The CNS processes other capacities that also contribute to one's success in school and life. As a result of its multiple channel organization, the nerve cells form networks that interlock and interact. This gives rise to the ability to associate a variety of stimuli with a variety of responses. The CNS also governs the ability to discriminate among stimuli and/or responses. This associational and discriminative capacity seems to be related to a storage or memory capacity, thus enabling one to recall associations and discriminations. These functions appear to be governed within the brain itself and are vital to learning.

The Central Nervous System as a Regulator of Behavior

How does the CNS effect behavior? Because the CNS (remember, the brain is part of the CNS) initiates and inhibits all muscular activity, all movements is a result of CNS action. Thus the CNS regulates posture, that is, the ability to maintain a given degree of muscle excitation, and movement and the ability to attain a desired posture. As stated above, the CNS regulates the ability to respond to sensation from the environment. The CNS enables one to discriminate among stimuli and movement patterns. The CNS enables one to associate stimuli with stored

memories of past experiences. The CNS also enables one to search through this storage depot and selectively pull out memories.

Complex Combinations of Activity

In addition, the CNS enables one to combine these basic behaviors into compiex combinations of activity. The CNS enables one to receive a sensation, discriminate this sensation from others, scan a variety of responses, search memory for both similar and dissimilar circumstances from the past, select a set of responses, program the muscles to produce this set of responses and, then, actually produce the movements necessary for this response. Some of the CNS's activities are done simultaneously and some sequentially. In addition, they are done while inhibiting responses to other stimuli. Thus, a student may be able to carry on a reasoning and problem-solving task while maintaining appropriate sitting posture, adjusting his/her vision and hearing to the classroom conditions, ignoring inappropriate behavior of other students, maintaining appropriate body temperature, and inhibiting the urge to urinate.

It is important to view emotional behavior as a complex combination of muscle activity. Thus, one may hear a particular group of words and smile and then give way to a cascade of laughter. All this is muscular behavior governed by the central nervous system.

Communication as a Complex Combination of Activities

Communicative tasks require one to simultaneously manage both internal and external behavior. Communicative behavior is vital to the learning process. It must be recognized that communicative activities require the complex interrelated activities of the CNS so that one may regulate internal bodily functions, posture, and movement while receiving sensations from the sensory end organs, transmit this information upward toward the brain through multiple channels, discriminate among stimuli, search memory, note common characteristics among memories hitherto unrelated, scan possible responses, formulate a plan of muscle movements to implement the selected response, and produce the responses.

Creativity as a Complex Combination of Activities

In addition to the complexity noted above, communication requires the repeated creation of novel utterances. Only in drama or other circumstances requiring memorized utterances do persons utter planned sentences. In conversation, including classroom activities, utterances are formulated on the spot. One plans in terms of general goals for communication and depends on the intrastructure of the CNS to produce utterances acceptable in vocabulary, grammar, length, loudness, pitch, and pronunciation, all at an incredibly rapid pace. It is because of the CNS's ability to operate simultaneously at multiple levels and through multiple channels that such pell-mell creativity is possible.

Summary Statements

The central nervous system is composed of the brain and the spinal cord.

The central nervous system regulates all behavior, including emotional responses, by initiating and inhibiting muscle movement.

The central nervous system makes it possible for one to benefit from experiential and abstract learning throughout life.

The central nervous system makes it possible to act upon stimuli by responding, discriminating categorizing, recalling, and associating.

The central nervous system makes it possible to respond to a variety of stimuli simultaneously.

The central nervous system makes it possible to respond in a manner which is approved by one's culture: to know how to respond, to know when to respond and when to wait, to know the degree of response which is allowable, and to know what form of response is acceptable.

Some of the CNS's activities are done simultaneously and some sequentially. In addition, they are done while inhibiting responses to other stimuli.

PHYSICAL, PSYCHOLOGICAL AND EMOTIONAL IMPLICATIONS OF TRAUMATIC BRAIN INJURY

The brain is the computer of the body.

The brain is the key to our central nervous system. It controls our thoughts, feelings, and major movements. The brain is the computer of the body, acting as the receptor of information, and determinant of appropriate responses.

Damage to the brain may be caused by developmental factors, disease or infection, perinatal factors, or traumatic events such as drowning, smoke inhalation, or a blow to the head. The primary focus of this manual is injury to the brain caused by traumatic events.

Physiological Impact of Traumatic Brain Injury

When the brain receives an injury, any and all parts may be affected.

When the brain receives an injury, any and all parts may be affected. The rough bony interior of the skull damage the brain as it rebounds within the skull, stretching and tearing neurons causing bleeding. Bleeding and swelling often lead to further injury since there is no room for expansion.

Traumatic brain damage may result in coma, a state of unconsciousness from which a person cannot be aroused, even by powerful stimulation.

Serious brain injury can be a threat to many of our important daily functions. A severe left-side injury can affect our ability to speak and to communicate thoughts visualized on the undamaged right side of the brain. The range of brain injuries is very large. At one end, a brain injury may cause only a minor bruise or headache for several days. At the other end, a severe brain injury can physically immobilize, prevent communication or reception of information, reduce judgement ability to that of a child, or worse, cause death.

Consequences of Traumatic Brain Injury

Even minor Traumatic Brain Injury requires accurate diagnosis and treatment.

The consequences of Traumatic Brain Injury (TBI) are variable. Unconsciousness lasting only a few moments (concussion), may not result in brain damage or long-term disability, even though individuals may be confused for several hours or days. In other cases, what seemed like a mild blow can cause serious damage. Even minor Traumatic Brain Injury requires accurate diagnosis and treatment.

The brain is a complex network of regions, nerves, and passageways. Injury to any one part of it can affect one or more everyday functioning abilities. Movement disorder, emotional problems, mental processing, sensory perception, and memory are just a few of the potential problems of the brain-injured patient.

The effects of diffuse brain damage can be varied, causing attentional deficits (passive, active, mental tracking) slowed processing, or difficulty with bilateral integration. Psychological consequences include perplexity, distractibility, and fatigue. Emotional consequences may encompass irritability, anxiety, and depression, seriously affecting social interaction.

Traumatic brain damage may result in coma, a state of unconsciousness from which a person cannot be aroused, even by powerful stimulation. There are several levels of coma which describe increasing awareness of surroundings. Professionals measure levels of consciousness by scales such as the Glasgow Coma Scale. (See Appendix.)

Injury to specific areas may cause specific difficulties. The consequences of temporal lobe damage include short- and long-term memory problems and speech and communication disorders. Limbic system disturbances are those that affect mood, appetite and sexual functions. The frontal lobe contributes to our humanness. Damage to this area of the brain may result in decreased cognitive efficiency and affects our ability to make executive decisions. The cortex regulates drive and motivation.

Issues Surrounding Traumatic Brain Injuries

When we acknowledge the unique characteristics of the student with Traumatic Brain Injury, we must also recognize the unique needs. The grouping of students with disabilities has, in the past, generally corresponded to existing state and federal funding categories. Historically,

the school placement of the student with TBI was sometimes determined by what school districts saw as the primary disability (e.g., orthopedically impaired, emotionally disturbed, cognitively impaired). Attempts to fit the student with TBI into one of these categories was typically unsuccessful because a single category could not address all of the needs of the student with TBI or accommodate the changes as recovery progressed. The student with TBI may experience recovery for months or even years following the trauma and the educational needs will change because of that recovery, as well as in response to the instructional program.

Traditional testing procedures may also lead to inappropriate placement and services. Many school psychologists are unfamiliar with the unique discrepancies displayed by students with TBI. Test results often may not represent the full picture of these students' abilities or needs.

Students with poor recovery from head injuries may require nursing home placement due to new physical and/or health needs. School districts must then decide how best to serve the educational needs of these students.

Overall, there is a lack of school system and community awareness of the needs of the student with TBI. This lack of awareness leads to frustration for students, parents, and staff as they struggle with the appropriate education of a student. Contact with a support group locally and nationally to see what others have done and are doing can be helpful in creating a satisfactory resolution. Some of these groups are noted in the resource section of this manual.

Overall, there is a lack of school system and community awareness of the needs of the student with TBI.

PROPOSED DEFINITION OF TBI

As this goes to press, the following definition has been proposed for the implementation of services to students with Traumatic Brain Injury, (Federal Register, August 19, 1991):

"Traumatic Brain Injury means an injury to the brain caused by an external physical force or by an internal occurrence such as stroke or aneurysm, resulting in total or partial functional disability or psychosocial maladjustment that adversely affects educational performance. The term includes open or closed head injuries resulting in mild, moderate, or severe impairments in one or more areas, including cognition; language; memory; attention; reasoning; abstract thinking; judgement; problem-solving; sensory perceptual and motor abilities; psychosocial behavior; physical functions; information processing; and speech. The term does not include brain injuries induced by birth trauma."

A similar definition will be developed in Oregon, which will allow school districts to identify and serve students with Traumatic Brain Injuries.

Each year 50,000 to 70,000 people are left with intellectual impairment.

INCIDENCE OF TRAUMATIC BRAIN INJURY

Trauma is the leading cause of death in the United States for persons under the age of 34 (Surgeon General's Report, *Health United States*, 1980). According to the National Head Injury Foundation, the number of deaths each year resulting from trauma to the brain is estimated at over 140,000. There are upwards of one million cases of children sustaining head injury each year.

The most frequently injured group are people between the ages of 14-25.

Each year 50,000 to 70,000 people are left with intellectual impairment which preclude their return to a normal life. Ninety percent of people with head injuries suffer at least some transient cognitive, motor or sensory aberration. Forty to eighty percent of this group have residual physical, intellectual, or behavioral deficits (Bigler, 1987). The estimated prevalence of brain injuries in the United States is 1,000,000 to 1,800,000. The numbers of less severely brain injured patients are massive and hard to establish accurately because they are frequently documented under their other injuries (e.g., broken bones or internal injuries). The severely disabled are difficult to track once they are discharged to the care of family members in their homes.

The most frequently injured group (over 70%) are people between the ages of 14-25, according to the National Head Injury Foundation. It is estimated that males incur anywhere from 50-65% of all head injuries. Over 60% of head injuries are caused by automobile or motorcycle accidents. In 1983, over $110.5 billion was spent on the care, treatment, and rehabilitation of the brain injured.

TRAUMATIC BRAIN INJURY IN CHILDREN VERSUS ADULTS

It will be easier for an adult to regain reading ability, than for a child who is learning to read.

Much of what we know about TBI is based on studies of adults; however, we know that the effects of head injury and outcomes are different for children than adults.

1. Children recover motor and verbal skills faster than adults.
2. However, it is easier to relearn old skills than it is to learn new ones. For example, it will be easier for an adult to regain reading ability, than for a child who is learning to read when injured. Children are still developing new skills at the time of injury; they have

not learned as much as adults and this will influence outcome.

3. In addition, there are brain functions that do not emerge until later ages. Higher order functions such as concept formation and planning do not appear until later elementary school years. Consequently, effects of injuries that occur before these functions develop will not be apparent until later in the child's development.
4. And, children's injuries tend to be more diffuse than focal. A diffuse injury may affect the entire range of academic achievement.

Head Injury at Different Ages

The results of a traumatic brain injury are different for children at various ages. Mira, Tyler & Tucker (1988) highlight these differing effects of head injury at different ages.

Preschool

Children who are injured during the preschool years, even those with severe injuries, may appear to recover fully after the injury. They recover motor and speech skills, and often teachers and parents expect that they will develop and function normally in subsequent years. However, these children often develop academic problems when higher order skills and functions are needed. An IQ may be normal, but the child still has significant academic difficulties.

Early Elementary School

Early elementary school-age children have developing brains, and injuries producing a coma of 24 hours or more are likely to produce persistent intellectual difficulties.

While they respond well to school resumption, these children are likely to have difficulty as they progress through the grades. They are able to store and recall facts fairly well, but obstacles arise as they encounter demands for high level cognitive functioning. Even intelligence test scores may decline.

Early Adolescence

Head injury in early adolescence presents special problems for children and schools. Although a head injury at this age may not have such profound effects on intelligence as it does in younger children, the behavioral and emotional effects may be greater. At this age, students are very concerned about physical appearance and social skills. Head injury interferes with the developing sense of self. Loss of confidence and feelings of depression may lead to isolation from peers. Issues related to sexual development and impact of the injury on future psychosocial functions become important. Psychological counseling is generally needed for children in the older elementary and early adolescent years. Such counseling may be required for 2 to 3 years to help the child deal with the multiple psychosocial effects of the head injury.

If a child sustaining a TBI had behavioral or emotional impairment prior to the injury it is more likely that subsequent psychosocial adjustment will be significantly impaired.

Adolescence

Sustaining a TBI at adolescence has a significant effect on academic functioning. High school class work requires complex cognitive and reasoning skills that range from difficult to impossible for the student with TBI. Another problem may arise because adolescents are planning their future. The student is looking forward to finishing high school and getting on with the next step of life, which may mean higher education or a job. The student has been anticipating leaving high school and gaining independence from family. It is difficult for the student to accept the need to take time from school to recover from the head injury, or to delay graduation because of a reduced course load or a shortened day. When there are sufficient residual deficits to indicate special services within the school, it is better that the student delay high school graduation to use school services that would not be available after graduation. This, however, can be a very difficult step for a high school student to consider.

Sustaining a traumatic brain injury at adolescence has a significant effect on academic functioning.

TYPICAL RECOVERY SEQUENCE FOLLOWING TBI

Motor	Gross motor functioning such as walking often improves more rapidly than other functions (within one to two months).
Sensory	These functions also improve relatively rapidly in children (within one to two months).
Speech	Communication skills, especially expressive speech may resolve within a few months, although more subtle language problems may persist indefinitely and unfortunately go unrecognized.
Measured IQ	IQ changes, particularly in mild head injuries may be relatively modest and appear to recover in the two months after injury. However, the change is usually not as rapid as motor, sensory and speech functions.
Memory and Attention	Difficulties in these areas may persist for many months after mild and moderate injuries and even longer in severe injuries.
Higher Level Cognition	Some functions may continue to be impaired for years, if not permanently. These include: information processing; learning under complex or difficult situations; and ability to function effectively and efficiently in novel situations. TBI children tend to be negatively affected by stress more easily than before.

REHABILITATION

School district personnel can contribute valuable student information to the hospital rehabilitation team.

Rehabilitation begins while the person is in coma. Early intervention by the multidisciplinary rehabilitation team increases the possibility of maximum recovery medically, physically, cognitively, and psychologically.

Where possible, early contact and communication between the local school districts and the medical facility are encouraged. School district personnel can contribute valuable student information to the hospital rehabilitation team.

SCHOOL REENTRY

Philosophy

The transition from the rehabilitation setting to the home school will be facilitated by comprehensive planning, structure, and consistency. As in the rehabilitation facility where the students were involved with a team of professionals, their school success will be maximized by an overlapping group approach. The school team, in addition to a case manager, might include:

Parent
Speech and language therapist
Occupational therapist
Physical therapist
Adaptive P.E. teacher
Special education teacher
Counselor
Social worker
School psychologist or neuropsychologist
Classroom teacher
School nurse
Vocational rehabilitation counselor
Administrator
Advocate
Medical personnel
Child development specialist

As many members of this newly formed team as possible should visit the rehabilitation facility. Observation of the student in this setting, and information from the rehabilitation team members will prove to be invaluable. The student's adjustment to the school environment, and his ability to reach his full potential, will be determined by a team that works as an organized system, integrating all disciplines. Emphasis should be placed on psychological issues, which cause more problems than do academic issues. When properly structured, the home school can be the ideal situation in which to continue the rehabilitation process.

Reentry Team Considerations

I. Medical Conditions
   A. Fatigue level
   B. Medication information and procedures
   C. Emergency information
   D. Bowel and bladder issues
   E. Diet
   F. Skin care
   G. Other

II. Organizational Details
   A. Time schedule for transition, team meeting schedule
   B. Individual Education Plan (IEP)
   C. Initial attendance -- long-term attendance goals, collapsed schedule
   D. Length of school day
   E. Transportation to and from school
   F. Movement within school building
   G. Placement in area of the classroom
   H. Choice of "check-in" person (coordinator of daily activities)
   I. Safety concerns
   J. Bathroom needs
   K. Lunch, recess, and assembly plans
   L. Compensatory tools, organization systems, student helpers, study guides, calculators, computers, adaptive equipment
   M. Personal aide
   N. Other

III. Academic Issues
   A. Test data, schedule for frequent neuropsychological testing (every 6 months recommended)
   B. Inservice for staff on TBI learning styles
   C. Review of educational program in rehabilitation setting

Designation of mild, moderate, and severe may not be the best indicators of outcome or potential for school related problems.

When properly structured, the student's school can be the ideal situation in which to continue the rehabilitation process.

Reentry Team Considerations

I. Medical Conditions
II. Organizational Details
III. Academic Issues
IV. Social and Emotional Concerns

Reentry Procedure

Preplan
Plan
Implement
Evaluate
Reevaluate and Adjust

D. Flexible placement that can readily be changed
E. Plan to decrease academic load without sacrificing learning
F. Other

IV. Social and Emotional Concerns
A. Counseling: individual, family, sexual, support groups
B. Plan to modify behavior -- verbal and nonverbal cues
C. Education of peers and staff
D. Buddy system
E. Peer activities planning
F. Videotape to see themselves as others do
G. Manage impulsive, unpredictable, aggressive behavior
H. Other

To benefit from a school experience, students with TBI should be able to do the following tasks: (Cohen, Joyce, Rhodes and Welks, 1985)

- attend to a task for 10 to 15 minutes,
- tolerate 20 to 30 minutes of general classroom stimulation,
- function within a group of two or more students,
- follow simple directions,
- engage in some type of meaningful communication, and
- give evidence of learning potential.

School Reentry Procedure

Preplan
Collaborate with medical facility
Prepare school staff with general information on TBI
Obtain medical and educational histories
Observe student in various contexts
Assess student's performance
Determine what modifications are needed
Assess school's capabilities and staff availability
Prepare staff with specific training on TBI
Form networks of support

Plan
Obtain input from parents, teachers, rehabilitation professionals, specialists, and administrators
Discuss expectations and fears
Discuss student's strengths, gifts, talents as well as needs
Brainstorm a plan

Implement
Take action on the plan
Train nondisabled peers
Observe student's behaviors, performance, and responses
Associate these with assessment results
Help teachers self-evaluate their own teaching behaviors, strategies, and procedures
Provide support needed by student with TBI, other students, and staff
Set schedule for evaluating progress

Evaluate
Maintain ongoing evaluation
Obtain data from a variety of sources
Bring in outside resources to assist staff and students where needed
Maintain close contact with family, involving them in all decisions
Adjust plan to accommodate student's changing needs
Reevaluate and adjust

SERVING THE STUDENT WITH TBI

A student with a traumatic brain injury is NOT:

Mentally Retarded
Emotionally Handicapped
Learning Disabled

A student with a traumatic brain injury IS:

A student with unique learning needs. The head injured student is not a "peer" of other students with disabilities. The learning handicap has been acquired. There are many characteristics of students with head injury that make them different from students with other disabilities, Depompei & Blosser (1990). The student with TBI has:

- a previous successful experience in academic and social settings;
- self-concept of being normal before the injury;
- discrepancies in ability levels;
- inconsistent patterns of performance;
- variability and fluctuation in the recovery process resulting in unpredictable and unexpected spurts of progress;
- more extreme problems with generalizing, integrating, or structuring information;
- poor judgment and loss of emotional control which makes the student appear to be emotionally disturbed at times;
- cognitive deficits which are present as in other handicaps but are uneven in extent of damage and rate of recovery;
- combinations of conditions resulting from the TBI which are unique and do not fall into usual categories of disabilities;
- inappropriate behaviors which may be more exaggerated (more impulsive, more distractible, more emotional, more difficulty with memory, information processing, organization, and flexibility);
- learning styles which require utilization of a variety of compensatory and adaptive strategies;
- some high level skills which may be intact, making it difficult to understand why the student will have problems performing lower level tasks;
- a previously learned base of information which assists relearning rapidly.

Educators must be aware of these differences and their effect on learning in order to appropriately plan for class placement and participation.

A student with a traumatic brain injury may need:

- a recovery period of several years
- academic assessments on a frequent basis
- longer processing time for responses
- shortened assignments
- untimed multiple choice tests
- cognitive aids such as lists or memory books
- consistently used routine for handling assignments
- an opportunity to build on existing skills

Classroom placement should be based on the student's strengths and skills rather than on deficits.

The student with a traumatic brain injury needs an opportunity for a well-rounded education including both academics and creative expression.

The following eight pages contain a chart of teaching strategies. They are meant as a general guide only. The behaviors and needs of students with brain injuries are extremely variable. **Teachers must make professional judgements based on individual cases.**

The needs of the student with TBI are different than the needs of other students with disabilities.

Cueing systems may include assignment book, task cues, repeated instructions, written instructions, buddy system (for getting from class to class or for remembering assignments), maps for navigation within the school.

DEFICIT	BEHAVIOR	TEACHING STRATEGY
ACADEMIC SKILLS		
Decreased ability to plan.	Does not recognize due dates, or time required to complete class projects.	Help create a system for maintaining organization. Encourage use of a daily log of activities, schedules, assignment lists, and due dates; monitor frequently.
	Has difficulty getting to class on time.	Develop cognitive prostheses: wall charts, daily schedules, digital watches, watch alarms, timers, calendars, notebooks, lists, markers, tape recorders, and labels
	Forgets to bring materials for class	Use consistent structure for lessons and daily activities. Post a schedule of activities.
	Forgets to prepare for field trip.	Include activities which involve planning. Have the student organize an activity (e.g., a party).
		Provide orienting data several times a day. Remind a student of names, places, schedules, and goals. Have student repeat directions that were given for an assignment or for finding another class.
Decreased ability to store and retrieve information upon demand.	Has little concern for details.	Use visual and auditory cues to draw attention to details: highlight, underline, use reference pictures.
	Unable to recall specific details or sequence of a lesson.	Teach memory tricks and study skills. Have the student take notes or record information on tape. Underline or highlight key words in passages. Speak slowly; be clear, concise, concrete. Limit sentence length and complexity. Pair verbal statements or commands with pictures, demonstrations, or gestures. Use written directions. **REPEAT, REPEAT, REPEAT**
Decreased carryover for new learning.	Cannot recall or generalize information presented in class.	Teach memory strategies: categorize, associate, rehearse, chunk information. Rhyme words to help remember them. Make a word using the first letter of each word in a series that needs remembering (e.g., HOMES=Lakes Huron, Ontario, Michigan, Erie, and Superior).

DEFICIT	BEHAVIOR	TEACHING STRATEGY
		Rehearse verbally; practice visual imagery.
		Assign a student buddy to take notes or to monitor and check what has been written.
		Require written work.
		Teach to all learning styles and modalities.
Decreased ability to generalize learned information to new or different situations.	Is unable or refuses to take tests where newly learned information must be applied or generated.	Stress similarities. Provide a variety of examples of the topic.
		Provide study questions.
		Use multiple choice, fill-in-the-blank (include word list), or open book test.
Lack of initiative.	Forgets; does not complete or does not turn in homework.	Help develop a daily written assignment sheet. List due dates and times.
		Develop a consistent place and routine for turning in work.
Decreased ability to stay on task.	Is unable to begin and/or complete timed tests.	Simplify and organize the environment. Provide quiet space.
	Is unable to sit still in class.	Eliminate distractions and confusion; verbally cue the student to "begin" a task; nonverbally regain and redirect attention to the required task.
	Skips around while doing assignments; completes only parts of assignments.	Provide agenda; direct attention to what has been completed and what needs to be completed.
		Limit information; present short units.
		Provide breaks and/or rest periods.
		Provide optimal physical positioning. Use book holders, pencil grips, large print books.
Inability to perform well in competitive and stressful situations.	Has low tolerance for timed test situations.	Allow increased processing time.
		Do not use timed tests.
	Cannot complete work in the allowed time.	Use materials which do not require a time limit.
		Cut assignments in half; do every other problem.
	Argues and fights with peers during activities.	Use cooperative learning techniques.
		Use small group activities; gradually include full classroom activities.

Classroom aids may include calculator, tape recorder, writing aids, positioning equipment, augmentative communication devices.

Flexibility is a key ingredient for successfully integrating the student with TBI. Unlike other special education students who are neurologically stable, students with TBI may continue to change neurologically for weeks, months, or even years following return to school.

Environmental considerations may include noise level, activity level, special equipment, task arrangement, lighting, scheduling.

DEFICIT	BEHAVIOR	TEACHING STRATEGY
Low tolerance for frustration.	Has outburst of temper when others would try a different approach or request help.	Do not attempt to change the behavior using traditional behavior management approaches. Learn to detect behaviors leading up to the outburst and intervene prior to it happening (watch body language). Provide area that is quiet, that is away from activity. Allow time to be away from the situation and to get needed rest or emotional release. Provide an understanding person who will listen to feelings and frustrations. Model appropriate behaviors. Role play.
Inconsistent performance.	Does similar work correctly one day; incorrectly the next. Demonstrates model behavior one day and totally inappropriate behavior the next.	Discuss errors and how they might have been made. Point out similarities to previous work which has been completed successfully.
Inability to comply with classroom rules and teacher expectations.	Is withdrawn and not willing to participate in group activities. Refuses to recite in class.	Elicit individual response when you are sure that the student knows the answer; gradually request responses in small groups; repeat until the student feels comfortable participating in a large group. Encourage independence and initiation. Ignore fumbling. Write down directions so student can work independently. Use student help. Provide time for creative work in art, music, and literature. Give feedback on social behaviors. Talk about appropriate and inappropriate behaviors. Video tape sessions and study them together. Increase insight by discussing strengths and weaknesses. Don't argue. Provide clues from the environment. Encourage speech, but discourage confabulation. While working, limit discussion to that which is task oriented.
Rude, silly, immature for age.	Makes inappropriate comments to fellow students and teachers. Laughs out loud during serious discussions or quiet seatwork.	Present "what if...." situations and choices Provide opportunities to role play. Talk with student about appropriate and inappropriate behaviors. Video tape sessions and study them together. Increase insight by discussing strengths and weaknesses.

DEFICIT	BEHAVIOR	TEACHING STRATEGY
Verbally aggressive.	Interrupts conversations.	Teach good listening techniques. Have the student concentrate on the comments of others. Give nonverbal cues to discontinue interruptive behaviors.
EXPRESSIVE LANGUAGE		
Delayed responses	Does not answer immediately; appears not to know the answer.	Allow extra time to discuss and explain. Avoid asking too many questions. Give advance notice of questions; allow time to prepare answers. Phrase questions to allow choice of answer.
Word retrieval errors.	Uses "this," "that," "those things," "whatchamacallits." Difficulty providing answers on tests. Has disorganized syntax and difficulty thinking of words.	Teach the association skills. Encourage definitions or descriptions of words which cannot be recalled. Use semantic mapping or webbing techniques. Teach memory strategies (e.g., rehearsal, association, visualization, etc.). Encourage word retrieval. Use phonetic cueing and descriptions (e.g., "Can you tell me another way?").
Perseveration on words or phrases.	Starts to respond and gets "stuck" in the middle of a sentence. Repeats words or phrases (S: "He went, he went, he went").	Be patient. Repeat what has been said (T: "He went ...?").
Inadequate labelling or vocabulary to convey clear message.	Mislabels common objects, tools, materials, etc.	Teach vocabulary associated with specific subject areas and classroom activities.
Tangential communication	Rambles. Does not acknowledge listener's interest or attention.	Teach student to recognize nonverbal behaviors indicating lack of interest or desire to make a comment. (Work with this skill during private conversations with the student.) Teach beginning, middle, end of stories. Interrupt rambling speech; focus attention on the key issues.
Communication in informal situations differs from formal situations such as the classroom.	Answers questions at a surface level; unable to provide detailed explanation.	Encourage conversations to develop by giving instructions such as "Tell me more"; "How many did you see..."

Modification in materials/ tests may include enlarged print, simplified worksheets, take home tests, extra time.

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Ongoing success requires good case management. Good initial educational programs can easily deteriorate, either because the services fail to keep pace with the student's recovery and new developmental milestones, or because the student moves on to teachers who have not been oriented to the student's unique strengths and needs.

DEFICIT	BEHAVIOR	TEACHING STRATEGY
	Converses well in social situations; conversation in classroom lacks depth.	Role play formal conversations in small groups. Direct responses with verbal models, cues, and leading questions. Teach memory strategies (e.g., rehearsals, chunking, visualization, association, etc.).
Inability to describe events in sequence.	Relates details out of order. Can't explain directions for playing a game or doing an assignment.	Teach sequencing skills. Read short paragraphs and summarize; play games; do puzzles, sequencing activities, grouping, sorting, and categorizing. Use special education materials to teach specific skills.
Difficulty with abstract language; ambiguity, satire, inferences, drawing conclusions.	Says things that classmates interpret as satirical, funny, or bizarre, although they were not intended to be that way.	Teach the student common phrases used for satire, idioms, puns, etc.
Reduced verbal reasoning ability.	Gives a correct answer but unable to list the steps followed to solve a problem.	Teach inductive and deductive reasoning at appropriate age levels. Work with students privately to develop reasoning and explanations.
RECEPTIVE LANGUAGE		
Inability to determine salient features of "Wh.." questions, verbal information, or assignments read.	Completes the wrong assignment (e.g., instead of problems 9-12, student does 1-9).	Write assignments in daily log.
Inability to determine the specific aspects of questions that need to be asked.	Gets details confused when answering questions about details of a lesson. Responses may be related to specific questions, but not exact. Unable to decipher long story problems.	Ask questions which will elicit recall of important facts. Teach student to use highlighter to mark responses first. Encourage requests for clarification, repetition, a slower speed.
Failure to organize verbal or written information.	Performs steps out of sequence or fixates on one step.	Teach sequencing to sort and organize. Do not allow the student to skip steps, even if he says he knows what to do.

DEFICIT	BEHAVIOR	TEACHING STRATEGY
		Sequence instructions. Limit the number of steps. Discuss one step at a time. Check off each step as completed. Teach the structure of the task. Provide sample items describing how to proceed through a task. Use yesterday's work as a model for today's.
Inability to analyze or integrate information.	Disorganized or incomplete work. Confuses verbal directions; goes to the wrong room.	Provide written directions. Number directions. Have student cross off steps when completed.
Easily over-loaded.	Appears to be daydreaming or nonresponsive.	Focus attention. Pause frequently. Give time for processing information. Use short, simple sentences.
Inability to read nonverbal cues.	Unaware that the teacher or other classmates do not want to be bothered while working. Interrupts others.	Increase social awareness. Use preestablished nonverbal cues to alert the student that his behavior is not appropriate. Discuss.
Poor comprehension of lengthy or rapid speech.	Has poor notetaking skills; unable to select salient facts.	Use short, simple sentences, emphasizing key points by voice variations, intonations, etc. Alert the student to the important topics being discussed.
Difficulty understanding a sequence of events.	Gets lost in the daily routine (knowing order, or location of classes).	Provide written schedule of school routine and a map of the building with classrooms marked in order. Provide pictures of sequence of steps.
Difficulty with attention and comprehension.	Looses place while reading.	Provide additional time.
Ability to concentrate decreased.	Unable to relate information recently read. Easily distracted during reading assignments. Unable to complete silent reading and seatwork assignments at the same rate as classmates.	Reduce the amount of work to be done.

Teachers shouldn't emphasize having students catch up on missed assignments. They may have to focus on the deficits and develop teaching strategies to enhance learning as skills are regained or develop more permanent assistance when it appears that recovery is not occurring in specific areas.

If teaching strategies remediate cognitive and behavioral impairments so that a student acts more appropriately, placement options can increase. For example, helping the student gain self-control over impulsive behavior and decreasing the amount of disruptive or socially inappropriate behavior will go a long way towards placing the student in a less restrictive program.

DEFICIT	BEHAVIOR	TEACHING STRATEGY
Reduced ability to understand abstract language.	Misunderstands instructions and comments made. Does not understand humor.	Use correct language when presenting important information or correcting behavior. Teach the meaning of idioms, figurative language, ambiguous phrases, etc.
WRITTEN LANGUAGE		
Structure and content of the writing may not be of the same skill level as preinjury.	Has numerous grammatical errors in essays.	Give the student time to go over written work with a partner or teacher aide to find and correct errors. Teach vocabulary, grammar, and proofreading skills.
Sentence structure is simplistic and syntax disorganized.	Uses incorrect and unorganized sentence structure. Writes below age and grade level; themes may be simplistic, short and dry. Does not use figurative language; writing contains irrelevant or unsubstantial information.	Allow the student to verbally state ideas, tape record, or write from dictation. Use "question cards" to indicate the specific issues to be addressed in written assignments. Teach to current level of ability.
Decreased speed and accuracy. **Poor handwriting.**	Does poorly on timed tests.	Increase time and decrease requirements.
GENERAL BEHAVIORS - SOCIAL SKILLS		
Decreased judgement.	Is easily persuaded by others. Is impulsive. Speaks out of turn in class, gets up and moves about or leaves classroom.	Post class rules Discuss appropriate social conduct Use signals to cue student to alert behavior. Schedule time for frequent breaks. Establish specific rules for behavior.

DEFICIT	BEHAVIOR	TEACHING STRATEGY
	Is careless about safety. Does not look before crossing streets; poor decisions about playing on the playground or activities in PE class.	Use controlled setting before allowing student to be independent. **PRACTICE, PRACTICE, PRACTICE**
Inability to plan for the future.	Resents supervision.	Stress need for safety.
	Does not recognize physical or cognitive limitations.	Adjust complexity level of activities to the student's limitations. Build on success rather than failure. Provide appropriate vocational training.
Self insight lacking.	Doesn't understand other person's reaction to his behavior.	Point out inappropriate behavior. Describe appropriate behavior. Model behavior. Role play.
	Responds defensively to comments made or questions asked by teachers or fellow students.	Do not react or respond as if you need to prove a point; avoid confrontation; avoid "buying into" the argument.
Poor problem solving skills.	Solutions to situations are not carefully thought out.	Ask questions designed to help the student identify the problem, play out solution, and organize implementation of plan.

Provide support the student needs by allowing multiple opportunities to practice, appropriate role models, and carefully structured opportunities to learn.

TEACHING STRATEGIES SUMMARY

In summary, Blosser and Depompei (1990) offer the following suggestions:

- Organize small groups
- Provide verbal/written instruction
- Give ample time to complete work
- Avoid complex language
- Use examples (pictures, written, verbal)
- Allow time for processing
- Repeat instructions
- Re-define words and terms
- Develop a resource file
- Accompany homework assignments with written instructions
- Select a classroom buddy
- Permit assistive technology that can help student (tape recorders, calculators, typewriters, computers, etc.)
- Develop a system for maintaining organization
- Schedule time for emotional release and rest
- Find personnel who are willing to understand and help
- Plan extracurricular activities
- Modify and individualize assignments and tests
- Structure classroom environment
- Question student to be sure information is clear
- Plan fun learning activities
- Encourage discussion of problems

SCHOOL PSYCHOLOGISTS AND THE ASSESSMENT OF TBI

A well developed and thought out assessment is of foremost importance to the successful reintegration of the student with Traumatic Brain Injury. Telzrow (1991) suggested that such an assessment accomplishes several objectives, including: (1) establishing baseline levels and patterns of performance to monitor future recovery, (2) describing the student's functioning in critical areas to assist in educational planning, and (3) providing a means of evaluating recovery of functioning and monitoring the effectiveness of interventions.

As a key figure in conducting a diagnostic evaluation, the school psychologist must be aware of, and be prepared to deal with the challenges of evaluating the student with TBI. Traditional school psychological assessment is inadequate in comprehensively describing the functional and social skills, as well as the behavioral needs, of students with TBI. One major limitation of traditional evaluative techniques is that these approaches lack adequate sensitivity to thoroughly document and delineate neuropsychologically-based strengths and deficits. (Ewing-Cobbs and Fletcher, 1990). For example, many students who have sustained a traumatic brain injury may demonstrate average performance on traditional school psychological assessments, despite their inability to adjust to the educational setting and/or to perform various activities of daily living. A second difficulty encountered when using traditional evaluative approaches is that they are not sufficient for designing the most appropriate educational environment for the student with a TBI.

To achieve a level of "best practice" in the assessment of students with Traumatic Brain Injury, Telzrow (1991) and others have identified several characteristics of an effective comprehensive assessment. The first general characteristic is that the assessment procedures employed be in compliance with state and federal regulations for the education of handicapped children, and consistent with requirements requisite for the determination of special education eligibility.

A second characteristic would be an assessment with neuropsychologic orientation. This assessment would include a physical description of the injury and up-to-date medical status. A neurological orientation "provides a broader knowledge base from which to interpret psychoeducational data" (Obrzut and Hynd, 1990). These neuropsychologic evaluations may be directly accessible through school-based psychologists who have these specialized skills, and/or through a consultative/collaborative partnership with specialists in appropriate community based agencies. Given the dynamic nature of performance characteristics in students with TBI, assessments should be periodic and ongoing (Begali, 1987). This allows the multidisciplinary team to monitor recovery, while ascertaining the effectiveness of educational interventions.

The encompassing characteristic of the "best practice" TBI assessment is that it continue to maintain a multidisciplinary nature. The special needs of this population subsume the breadth of expertise provided by academic specialists, occupational and physical therapists, school social workers and psychologists, speech and language pathologists, and nurses. All of these professionals bring specialized school-based knowledge regarding treatment implications and interventions with regard to the assessment date obtained.

A reasonable question follows: What constitutes "good" assessment battery? A domain-specific, flexible battery approach to assessment is recommended for the student

Traditional school psychology assessment is inadequate in comprehensively describing the functional and social skills, as well as the behavioral needs, of students with TBI.

Table 1 - Test Instruments/Procedures Sensitive to Neuropsychologic Assessment Domains

Domain	Illustrative Instruments and Procedures		
Intelligence	Age-appropriate Wechsler Scale (WAIS-R, WISC-R, WPPSI-R) Differential Ability Scales (DAS) Kaufman Assessment Battery for Children (K-ABC) Stanford-Binet, 4th Edition Woodcock-Johnson Psycho-Educational Battery--Revised (WJPB-R): Tests of Cognitive Ability	Attentional Resources	Attention Deficit Disorders Evaluation Scale Connors Parent Rating Scale Connors Teacher Rating Scale Stanford-Binet, 4th Edition (Memory Area) Contextual assessments such as behavioral observations conducted in academic and nonacademic school settings
Language Abilities	Aphasia Screening Test (AST) Clinical Evaluation of Language Fundamentals--Revised (CELF-R) Peabody Picture Vocabulary Test--Revised (PPVT-R) Test of Auditory Comprehension of Language--Revised (TACL-R) Test of Language Competence--Expanded Edition (TLC-Expanded) Test of Word Finding (TFW) Token Test for Children Contextual assessments such as language samples conducted in academic and nonacademic school settings	Achievement	Basic Achievement Skills Individual Screener (BASIS) Kaufman Assessment Battery for Children (K-ABC): Achievement Scale Kaufman Test of Educational Achievement (K-TEA) Peabody Individual Achievement Test--Revised Woodcock-Johnson Psycho-Educational Battery--Revised (WJPB-R): Tests of Achievement Contextual assessments such as informal and teacher-made tests in academic subject areas
		Problem Solving and Abstract Reasoning	Category Test Tactual Performance Test Trail Making Test Wisconsin Card Sorting Test
Visual-Spatial and Constructional Performance	Constructional Praxis Tests Developmental Test of Visual Motor Integration Stanford-Binet, 4th Edition (Abstract Visual Reasoning Area) Contextual assessments such as samples of handwriting and art projects	Social Behavior	Child Behavior Checklist (parent and teacher forms) Vineland Adaptive Behavior Scale Contextual assessments such as behavioral observations in social or home settings
Somatosensory and Motor Functions	Bruininks-Osteretsky Test of Motor Proficiency Finger localization Finger oscillation Purdue Pegboard Test Somatosensory tests Tactual Performance Test Contextual assessment such as observations in physical education and during ADL		

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with TBI, and is felt to be preferable to the standard battery approach. The drawback to standard battery assessments is that they lack technical adequacy (not normed on this population), sensitivity to the specific issues often associated with TBI, and the practical limitations of the battery themselves, such as length (i.e., time involved). A flexible battery approach is preferable because it allows the sampling of specific areas of strengths and weaknesses unique to each student with TBI while being sensitive to neuropsychologic assessment domains. Although not an exhaustive list of domains or procedures, Table 1 has been included to provide a reference for consideration in the "best practice" TBI assessment. Regardless of the domains assessed, the goal is always to obtain a comprehensive sampling of performance across the range of behaviors sensitive to neuropsychologic functioning.

Finally, once assessment domains have been targeted, the examiner(s) must consider several issues that impact assessment procedures. These include the optimal time to evaluate and the frequency of evaluations, change and recovery issues, developmental issues, and the redundancy in assessment across agencies (Telzrow, 1991). Although school psychologists and other members of the multidisciplinary team will want to familiarize themselves more extensively to research in these areas, some basics apply to all TBI cases. Summatively, individual differences among TBI students preclude precise guidelines for when assessments should occur. It is prudent for the team to conduct assessments as close as possible to the time scheduled for school reentry, thus providing staff with the most up-to-date baseline data. Another suggestion would be to avoid scheduling evaluations during those periods when the student is experiencing rapid recovery of function. Comprehensive evaluations will be most beneficial to educational planning when the students performance is more stable (Baxter, Cohen and Ylvisaker, 1985). Programmatic, behavioral and developmental issues may best be solved by periodic and on-going assessments. However, to avoid needless repetition of assessments, medical, rehabilitation, and educational facilities should make every attempt to coordinate their evaluative procedures. Other confounding variables which should be considered include the impact of the students attentional or mental deficits, the student's physical impairments, and/or the effect of fatigue or medication. Any, or all, could have a profound effect not only on the design of the assessment (i.e., when, how long, etc.), but also the performance of the student with TBI.

Thus, even given the complex nature of problems associated with Traumatic Brain Injury, most schools have the requisite resources for successful educational reintegration of the returning student with TBI. Successful educational reintegration following a traumatic brain injury requires a concerted effort on the part of the school psychologist. to ensure commitment to careful and ongoing planning, a comprehensive multidisciplinary assessment, and a team approach designed to maximize the potential of the student with TBI returning to the educational environment.

To avoid needless repetition of assessments, medical, rehabilitation, and educational facilities should make every attempt to coordinate their evaluative procedures.

EDUCATIONAL NEEDS OF THE STUDENT WITH TBI WHO REMAINS IN A COMA-LIKE CONDITION

Successful educational reintegration following a traumatic brain injury requires a concerted effort on the part of the school psychologist.

An estimated range of 3% to 5% of children experiencing head injuries remain in a coma-like condition which the medical profession terms as persistive vegetative state (PVS). Their level of brain injury leaves them with significant impairments physically and cognitively, and with other sensory deficits. Most likely, their injury has left them with visual and auditory processing problems; unable to verbally communicate; unable to walk, stand or sit unassisted; and impaired ability to chew or swallow without choking. Consequently, these students need to be fed through gastrostomy or naso-gastro tubes. Students with this level of disability present many questions for their school district in determining the most appropriate education for them.

Districts will need to serve these students in their homes, in nursing homes, lifetime care hospitals, or in schools. They will need to address related service needs such as skilled nursing care in the classroom, appropriate speech/language communication therapy and occupational and physical therapy. Specialized equipment may be needed. If the injured student is a high school boy or girl of adult size, classroom staff may need a lifting device to help them transfer him/her. *Districts also need to be aware of and able to address the issues of family impact and needs.*

The principle of least restrictive environment as addressed in P.L. 94-142 and P.L. 101-476 should be considered in working with the child in a coma-like condition. When the child is medically stable, every effort should be made to return him or her to an appropriate school setting. The principle of normalization, where the child is offered activities that approximate the normal flow of a student's day, should guide the determination of appropriate educational goals and activities.

The injury may leave the child unable to talk, walk, or eat without assistance.

In areas where it is unlikely that the student will be able to participate independently in an activity, staff should try to adapt the activity so that the student can partially participate in it. A team approach will be most beneficial to the student and most supportive to the staff. Educational goals for the student should address the following areas:

- Cognitive
- Language (receptive and expressive)
- Social/Behavioral
- Leisure
- Adapted Physical Education
- Gross Motor Skills (including need for positioning throughout the day)
- Fine Motor Skills
- Activities of Daily Living (ADL)
- Feeding (This may be separated from the ADLs in a student with a tube feeding or with oral-motor difficulty.)
- Medical (including a protocol for emergencies)

Frequently it is difficult to separate goals by discipline for a student who is in PVS. For example, if the student is to use a switch-operated augmentative communication device while positioned in a way that promotes digestion and facilitates the student's volitional movement to trigger the switch, it is evident that all the staff must team to accomplish these goals.

Classroom staff will need to look at the appropriate classroom environment for the student, considering what type of stimuli would be meaningful to him and how to best present/introduce that stimuli.

The length of sessions and pattern of activities should maximize performance without overwhelming. It is vital

to recognize consistent responses and to assign intent to those responses. Staff must be able to "read" crying and grimacing behaviors and to develop strategies which address fatigue and arousal problems.

After the child has demonstrated increased tolerance to stimuli and increasing ability to organize the surrounding stimuli auditorily and visually, it would be appropriate to move on to more functional language goals. Cognitive/ language goals may include developing anticipatory excitement in the child, responding to staff cuing, signaling "more," and indicating "yes/no." Technology currently used with students with physical disabilities from other causes can be adapted for use with the student with TBI. District resources should be tapped to consult about which devices would be best to use with the student.

Controversy regarding the future recovery and current abilities of students considered to be in PVS exists within the medical profession. Many hospitals are providing coma arousal therapy to maximize post-coma recovery. Others believe a comatose person will come out of coma on his/her own and needs to be "rehab" ready to benefit from therapy. Schools, on the other hand, have a mandate to serve all children and must develop means to accommodate each child's needs.

After the child is medically stable, every effort should be made to return the child to an appropriate school setting.

Schools have a mandate to serve all children.

DESIGNING THE INDIVIDUALIZED EDUCATIONAL PROGRAM

The physical layout of the school is important.

Designing a useful Individualized Educational Program (IEP) in and of itself is a difficult task for any educator. Designing a useful IEP for the reentering student with Traumatic Brain Injury becomes an even more imposing task given the diversity and dynamic nature of the population. It is the extent and variety of behaviors that TBI students exhibit that must be taken into consideration when planning a reentry into the school setting. Not an easy task when, due to the diversity, specific guidelines cannot be shared from student to student when writing the IEP. Fortunately, some general features are basic to the educational adaptation of the population, and those will be reviewed here. IEP content, targeted to the specific strengths and weaknesses of the individual TBI student, should be developed by the student's multidisciplinary school-based team, inclusive of the parents, and should reflect the outcome of a flexible, domain-based assessment sensitive to neuropsychologic issues.

Fatigue and medication needs are two issues that must be dealt with and carefully monitored.

An individualized educational program (IEP) is typically developed by the parents of the student, the student's receiving teachers, a representative of the school district, members of the school-based multidisciplinary team (i.e., school psychologist, occupational and physical therapist, nurse, speech-language pathologist, etc.) and, whenever possible, a representative from the discharging agency, (i.e., hospital, care center, rehabilitation facility, etc.). With some young adults reentering, it may be appropriate to include them in this planning period. Federal law mandates that all IEP's will identify the current level of educational performance in all areas affected by the disability and develop annual goals and short term objectives. The IEP must state the specific service provisions, specific special education and related services to be provided, projected amount of each service instruction and duration of services, evaluation procedures to measure/monitor progress, the extent to which the student will participate in regular classroom programs, and the schedule to monitor progress.

Following the development of the IEP, a decision must be made about where the IEP program can best be accomplished. Determination of placement may include one of the following:

1. A regular classroom program with support services, modifications, and supplemental aids.
2. A regular classroom program with resource room support for part of the school day.
3. A self-contained special education program with options for time in regular classroom for specific activities (i.e., Art, Music, Lunch, etc.).
4. A totally self-contained special education classroom.
5. Home or hospital-based tutoring to maintain continuity in the education program.
6. Other placement, such as a community setting or state school.

Several considerations and modifications need to be entertained and delineated when writing an IEP, to ensure the returning student experiences a successful reentry. First of all, the physical layout of the school is important. Depending on the extent of residual physical impairment of the student with TBI, building design such as stairs, long halls and narrow passages could be major hindrances to building

and classroom accessibility. Also the physical organization of the classroom itself should be carefully considered. Open spaces may intensify attention and concentration problems due to increased visual and auditory distractions. The school and classroom need to be safe and orderly places, enabling the returning student with TBI to function in a more controlled learning environment.

Secondly, consideration should be given to the student's schedule. A gradual reentry (i.e., two hours, half-day, etc.) may be preferable to starting out with a full day program. Fatigue and medication needs are two issues that must be dealt with and carefully monitored. Careful planning around these variables will increase the student's chance of maximizing individual potential in the school setting while potentially decreasing behavioral and physical exacerbations. Another scheduling consideration is the modification of course load. Students with TBI require a course load built around their specific strengths and needs. This pertains not only to course content (i.e., academic, performance, etc.), but also the organization of the school day. The course content should be adjusted to meet the individual needs of the student with TBI while the course sequencing should address physical and mental stamina. If, for example, the student has targeted needs in reading recovery, it may be appropriate to schedule that class in the morning and follow it with a less strenuous class, such as keyboarding, or a non-academic class, such as art. More intensive classes should be scheduled in the morning when the student is less fatigued.

A third consideration when writing the IEP would be assigning an aide or "peer buddy" to do any of a variety of tasks, from individual tutoring to note taking; from facilitating the movements from class to class to carrying a lunch tray of the student with TBI. Providing the student with TBI assistance and allowing extra time to change classes or move from one activity to another greatly diminishes the potential for confusion and disorientation.

An aide or "peer buddy" may need to be assigned.

Adaptive equipment is a fourth consideration. It may allow the student with TBI to be more autonomous and successful in the academic setting. Based on the individual needs of the student, these material adaptations may be as sophisticated and costly as an augmentative communication system, or as simple and inexpensive as providing an "extra" set of text books/materials, allowing the student to have one set at school and one at home.

Adaptive equipment is a fourth consideration.

Finally, the student's related service needs must be identified and met. These services should not be fragmented, but, whenever possible, provided in an interagency team approach, integrating the physical, cognitive, psychosocial and educational domains. When incorporating these modifications into the student's IEP, it is important that it not become rigid. The goals of the IEP need to be flexible, open-ended, monitored, and reviewed to ensure appropriate reentry and development. The rehabilitation of students with TBI is rarely smooth and continual, and often not predictable. It is not uncommon for students with TBI to have rapid recovery spurts, sudden plateaus, and phases where previously learned material will appear to be forgotten. Parents, specialists, and especially educators, need to recognize that the student with TBI is different in many respects from other individuals with disabilities, such as those with learning disabilities, developmental disabilities or cognitive impairments. Rehabilitation and psychoeducational development does occur, but the federally mandated measurement and documentation for IEP purposes are often difficult to obtain. These facts make frequent IEP reviews imperative, typically occurring more often than once a year. The goal always should be to assist the student with TBI to progressively move

Parents, specialists, and especially educators, need to recognize that the student with TBI is different in many respects from other individuals with disabilities, such as those with learning disabilities, developmental disabilities or cognitive impairment.

Finally, the student's related service needs must be identified and met.

towards a less restrictive educational environment as the student continues to improve.

Recognition of Traumatic Brain Injury is still new to the educational setting. A student with Traumatic Brain Injury should not be treated as a homogeneous group, but must be seen as unique and treated individually. Educators faced with planning for the reentry of and teaching of students with TBI must understand the varied deficits, influence of the deficits on the student's behavior, and specific teaching strategies and program modifications to help these students achieve. These are the items for consideration when writing the individualized educational program (IEP). The IEP documents needs and drives program services and placement, allowing this unique population to maximize its potential within the educational setting.

MODIFYING THE EDUCATION ENVIRONMENT TO BETTER ACCOMMODATE THE STUDENT WITH TBI

There are several recent changes that will make it easier to meet the needs of the student with Traumatic Brain Injury. The recognition of Traumatic Brain Injury as a specific disability will eliminate the frustration of many parents and school district administrators who had struggles in the past to somehow "fit" the student with TBI into the traditional, static categories. PL 101-476, the Individuals with Disabilities Education Act (IDEA), added TBI as a separate category. In conjunction with that, SB 119 amended ORS 343.035 to include TBI as a recognized disabling condition in Oregon.

With this recognition, goes a greater effort to focus resources on students with TBI and the educational staff who are serving that student. A variety of inservice training, printed resources, and software are being developed to help teachers, therapists, and other personnel.

There is also a greater awareness of the need to modify and adapt the learning environment to better meet the special needs of students with disabilities of all kinds. Case law and policy interpretation letters from the U.S. Office of Education, Office of Special Education have clearly highlighted the need to make modifications within the regular education setting either instead of, or in combination with placement in special education classrooms. Demanding compliance with rigid regular education requirements is no longer acceptable. Schools must make clear and documented modifications to all aspects of the school environment to facilitate the accommodation of the student with special needs. This applies to the student with TBI as well as other types of disabilities.

Modifications could include a variety of options such as changing the teaching mode, modifying the school setting, adapting instructional materials, or the use of special strategies to provide additional support to the student with special needs. The next two pages contain sample checklists which may be used to modify the elementary and secondary classroom settings to better meet the needs of the student with Traumatic Brain Injury.

MODIFYING THE ELEMENTARY CLASSROOM

For a Student with Traumatic Brain Injury

Student: _____ Teacher: _____ Birth Date: _____ Today's Date: _____

Presenting Concern: _____

Change the Teaching Mode:

_____ Repeat directions
_____ Increase active participation
_____ Teacher circulate around room
_____ Provide visual prompts (board/desk)
_____ Provide immediate feedback (student corrects own work)
_____ Teach semantic mapping
_____ Use frequent review of key concepts
_____ Teach to current level of ability
_____ Speak more slowly or loudly
_____ Reteach
_____ Use peer tutor
_____ Use small group instruction
_____ Use simple sentences
_____ Use individualized instruction
_____ Pause frequently
_____ Discuss errors and how made
_____ Use cooperative learning
_____ Utilize instructional assistant
_____ Other: _____

Modify the School Setting:

_____ Post class rules
_____ Give preferential seating
_____ Change to another class
_____ Change schedule (more difficult classes in the morning)
_____ Post daily schedule
_____ Eliminate distractions
_____ Modify length of school day
_____ Provide time for frequent breaks
_____ Provide place for quiet time
_____ Maintain consistent schedule
_____ Other: _____
_____
_____

Adapt Instructional Materials:

_____ Reduce length of assignments
_____ Use easier materials
_____ Use aids (calculator, word processor)
_____ Underline or highlight words
_____ Change skill/task
_____ Use manipulative materials
_____ Use color-coded text
_____ Use books-on-tape
_____ Use graphic organizers (visual/spatial displays)
_____ Modify testing mode/setting
_____ Other:_____

Enhance Home/School Relations:

_____ Parent conferences every _____
_____ Daily/weekly reports home
_____ Parent contract
_____ Home visits on _____
_____ Other: _____

Modify Student's Behavior:

_____ Reteach expected behavior
_____ Increase student success rate
_____ Learn to recognize signs of stress
_____ Give nonverbal cues to discontinue behavior
_____ Reinforce positive behavior (4:1)
_____ Use mild, consistent consequences
_____ Set goals with student
_____ Use schoolwide reinforcement with target student
_____ Use group or individual counseling
_____ Teach student to attend to advance organizers at beginning of lesson
_____ Provide opportunities to role play
_____ Other: _____
_____

Marshal Resources From:

_____ Occupational therapist
_____ Physical therapist
_____ Speech and language specialist
_____ Other (including past) teachers
_____ Resource teachers
_____ Resource specialist
_____ School psychologist
_____ Student study team
_____ Child Development Specialist
_____ Principal/assistant principal
_____ Rehab facility
_____ Other_____
_____

Provide Needed Support (buddy system):

_____ Explain disabilities to other students
_____ Teach peers how to be helpful
_____ Position appropriately
_____ Point out similarities to previous work
_____ Teach sequencing skills
_____ Teach study skills
_____ Teach visual imagery
_____ Write assignments in daily log
_____ Encourage requests for clarification, repetition, etc.
_____ Teach memory strategies
_____ Elicit responses when you know student knows the answer
_____ Allow extra time
_____ Other: _____
_____
_____
_____

Record of all modifications attempted.
Reed/Oregon Department of Education, 1991

MODIFYING THE SECONDARY CLASSROOM

For a Student with Traumatic Brain Injury

Student: _____ Teacher: _____ Birth Date: _____ Today's Date: _____

Presenting Concern: _____

Change the Teaching Mode:

_____ Repeat directions
_____ Increase active participation
_____ Teacher circulate around room
_____ Provide visual prompts (board/desk)
_____ Provide immediate feedback (student corrects own work)
_____ Teach semantic mapping
_____ Use frequent review of key concepts
_____ Teach to current level of ability
_____ Speak more slowly or loudly
_____ Reteach
_____ Use peer tutor
_____ Use small group instruction
_____ Use simple sentences
_____ Use individualized instruction
_____ Pause frequently
_____ Discuss errors and how made
_____ Use cooperative learning
_____ Utilize instructional assistant
_____ Other: _____

Modify the School Setting:

_____ Post class rules
_____ Give preferential seating
_____ Change to another class
_____ Change schedule (more difficult classes in the morning)
_____ Post daily schedule
_____ Eliminate distractions
_____ Modify length of school day
_____ Provide time for frequent breaks
_____ Provide place for quiet time
_____ Maintain consistent schedule
_____ Move class site to avoid physical barriers (stairs, long halls, change of building)
_____ Other: _____

Adapt Instructional Materials:

_____ Reduce length of assignments
_____ Use easier materials
_____ Use aids (calculator, word processor)
_____ Underline or highlight words
_____ Change skill/task
_____ Use manipulative materials
_____ Use color-coded text
_____ Use books-on-tape
_____ Use graphic organizers (visual/spatial displays)
_____ Modify testing mode/setting
_____ Other: _____

Enhance Home/School Relations:

_____ Parent conferences every _____
_____ Daily/weekly reports home
_____ Parent contract
_____ Home visits on _____
_____ Other: _____

Modify Student's Behavior

_____ Reteach expected behavior
_____ Increase student success rate
_____ Learn to recognize signs of stress
_____ Give nonverbal cues to discontinue behavior
_____ Reinforce positive behavior (4:1)
_____ Use mild, consistent consequences
_____ Set goals with student
_____ Use key students for reinforcement of target student
_____ Use group or individual counseling
_____ Teach student to attend to advance organizers at beginning of lesson
_____ Provide opportunities to role play
_____ Teach student the grading system
_____ Other: _____

Marshal Resources From:

_____ Occupational therapist
_____ Physical therapist
_____ Speech and language specialist
_____ Other (including past) teachers
_____ Resource teachers
_____ Resource specialist
_____ School psychologist
_____ Student study team
_____ Counselor
_____ Principal/assistant principal
_____ Rehab facility
_____ Other: _____

Provide Needed Support

_____ Use peer-partner (Buddy system)
_____ Explain disabilities to other students
_____ Teach peers how to be helpful
_____ Position appropriately
_____ Point out similarities to previous work
_____ Teach sequencing skills
_____ Teach study skills
_____ Teach visual imagery
_____ Write assignments in daily log
_____ Encourage requests for clarification, repetition, etc.
_____ Teach memory strategies
_____ Elicit responses when you know student knows the answer
_____ Allow extra time
_____ Develop objective grading system using daily participation as a percentage of weekly and final grades
_____ Schedule regular meetings for all staff to review progress and maintain consistency
_____ Other: _____

Record of all modifications attempted. Reed/Oregon Department of Education, 1991

GLOSSARY

Activities of daily living (ADL) -- activities that typically happen daily in a person's life (e.g., eating, bathing, toothbrushing, dressing, undressing). In a rehab setting these are traditionally addressed by the occupational therapist.

Assign intent -- verbally attach meaning to a sound or movement made by a nonverbal person. The expected outcome is that the person will pair the intention verbally assigned with specific movements/sounds so they will be able to communicate using those behaviors.

Augmentative communication -- a technique designed to support, enhance, or augment communication of individuals who are not independent verbal communicators in all situations.

Closed head injury -- injury causing damage by impact but not penetrating the brain or its protective covering.

Coma arousal therapy -- vigorous method of attempting to achieve arousal in comatose patients by applying stimulation to all five senses with greatly heightened frequency, intensity, and duration.

Confabulation -- the fabrication of experiences recounted to fill in and cover up gaps in memory. The student may believe the information is correct and is not intentionally distorting things.

Disinhibition -- inability to stop inappropriate comments.

Disorganized syntax -- use of words in the wrong order, even though the point is clear the sentence may sound unusual.

Flat affect -- little variation in emotional expression.

Gastrostomy tube -- tubing placed through the abdomen into the stomach and used for feeding patients who might choke if fed through the mouth.

Impulsivity -- reckless acts without consideration of the consequences because social judgement and planning abilities are impaired.

Irrelevant speech -- statements that make sense but don't have anything to do with the conversation.

Jargon -- words that are not real words and have no meaning or words that are close to the word the student means to say (e.g., "korf" for "fork").

Lability -- decreased control over emotional reactions, easily triggered and quickly changed emotions, may have superficial moods and displays of emotion.

Neuropsychology -- the branch of psychology that looks at the damage site of the brain injured individual and identifies the impact on cognitive and behavioral function.

Partial participation -- the level of a student's independent involvement in an activity that has been adapted so that a student can participate in it: some of the steps of the activity or all the steps of an activity achieved with varying levels of physical assistance from staff or peers.

Perseveration -- repetition of a behavior or train of thought beyond its usefulness (e.g., repeating a word several times, giggling long after it's appropriate, waving continuously).

Persistive vegetative state -- condition following severe head injury where the person remains behaviorally unresponsive with no indication of mental functioning even though he may move limbs, swallow, make sounds, or have periods of wakefulness and sleep.

Tangental expressions -- behavior in which a student's speech rambles on and on while moving further and further from the original point.

Trauma -- injury or wound to the body.

RESOURCE INFORMATION

Oregon Head Injury Foundation

PO Box 11295
Eugene, OR 97440-3295
(503) 689-7310

Washington State Head Injury Foundation

300 120th Avenue NE
Building 3, Suite 131
Bellevue, Washington 98005
(206) 451-0000

National Head Injury Foundation

1140 Connecticut Avenue NW, #812
Washington DC 20036
(508) 485-9950

Family Head Injury Support Group

c/o Judy Parks
4115 NE 18th
Portland, Oregon 97210
(503) 282-4087

Oregon Research Institute

Family Support Project
2330 McClean Blvd.
Eugene, OR 97405
(503) 342-8445

Oregon Department of Education

Office of Special Education
Regional Services Director
700 Pringle Parkway SE
Salem, OR 97310-0290
(503) 378-3136
or
Dr. Penny Reed
c/o Douglas ESD
1871 NE Stephens
Roseburg, OR 97470
(503) 440-4791

Emanual Hospital

Pediatrics Department
Beth Blodgett, M.D.
2801 N. Gantenbein
Portland, OR 97227
(503) 280-3042

Oregon Health Science University

Child Development and Rehabilitation Center
Dr. Jack Hegrenes (funding) (503) 494-8304
Ingrid Leckliter, Ph.D. (rehab) (503) 494-8320
PO Box 574
Portland, OR 97207-0574

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PROPOSED BILL OF RIGHTS FOR THE BRAIN INJURED

WE, AS BRAIN-INJURED INDIVIDUALS, HAVE THE FOLLOWING RIGHTS:

1. The right as unique individuals, even though victims of brain injuries, to be treated with dignity, respect and consideration. The same right is to be afforded our families.

2. The right to treatment by medical and support staff who are competent in the diagnosis and treatment of brain injury in its many manifestations.

3. The right for ourselves and our families to know the costs related to being injured -- not only the medical and rehabilitation costs, but the emotional, social, and familial costs.

4. The right to honest and open communications with medical, rehabilitation, educational and vocational specialists, professionals and para-professionals, as well as with representatives of private and public corporations and agencies who themselves are knowledgeable about brain injury.

5. The right to the emotional support of friends, community groups, and organizations and agencies, public and private, to assist us in our recovery and to assist in the reduction of needless suffering of our families.

6. The right to timely, aggressive, and low-cost legal representation.

7. The right to competent respite or home care to provide our families with relief from time to time, during which neither they or ourselves will need to worry about the quality of our care while they are away.

8. The right, not only to rehabilitation and job training, but to job placement and job opportunity.

9. The right to live in an educated community that is aware of and understands the problems of the person with a brain injury.

10. And lastly, we, as individuals with brain-injury, have the right to live in a society wherein the people and their legislators have not only made the prevention of brain injury a priority, but have also made the consequences for the perpetrators of brain injuries equitable to the needs of the brain-injured and their families.

Based upon the unmet needs of those responding to the Michigan Head Injury Alliance Membership Survey, 1984.

COMA ASSESSMENT SCALES

with stimulation techniques

The Rancho Levels of Cognitive Functioning Scale and the Glasgow Coma Scale are two widely used tools in the assessment of head injuries. The Glasgow Coma Scale measures broad-based, general characteristics of consciousness by grading certain responses, while the Cognitive Functioning Scale measures behavioral responses by observation.

Glasgow Coma Scale: An Assessment of Impaired Consciousness

The most consistent characteristic of the brain damage that results from head trauma is impaired consciousness or coma. Studies have confirmed that the degree and the duration of coma provide a reliable guide to the severity of **diffuse** brain damage. The Glasgow Coma Scale was developed to assess and quantitatively designate the level of consciousness an individual is experiencing in coma, and to predict the outcome. (Teasdale & Jennett, 1974)

The Glasgow Coma Scale is a measuring tool used to determine broad-based, general characteristics of consciousness by grading eye opening (E), motor response (M), and verbal responses (V) of the head-injured individual (see chart below). This assessment of the patient's level of consciousness is not only important

Examiner's Test		Patient's Response	Assigned Score
Eye Opening (E)	Spontaneous	Opens eyes on own	E4
	To Speech	Opens eyes when asked in a loud voice	3
	To Pain	Opens eyes when pinched	2
	To Pain	No response when pinched	1
Best motor response (M)	To Commands	Follows simple commands	M6
	To Pain	Pulls examiner's hand away when pinched	5
	To Pain	Pulls a part of body away when examiner pinches him	4
	To Pain	Flexes body inappropriately to pain (decorticate posturing)	3
	To Pain	Body becomes rigid in an extended position when examiner pinches victim (decerebrate posturing)	2
	To Pain	No motor response when pinched	1
Verbal (talking) (V)	To Speech	Carries on a conversation correctly and tells examiner where he is, who he is, and the month and year	V5
	To Speech	Seems confused or disoriented	4
	To Speech	Talks so examiner can understand victim, but makes no sense	3
	To Speech	Makes sounds that examiner can't understand	2
	To Speech	Makes no noise when spoken to	1

as an index of the severity of brain damage, it also allows for the monitoring of the recently head injured individual and for the notation of change in his or her condition. A major advantage of the scale is that those who use it -- nurses, general surgeons, neurosurgeons, or junior or senior physicians -- all obtain consistent results.

Coma may be defined as not opening the eyes, not obeying commands and not uttering understandable words. Using the Glasgow Coma Scale, the responses to testing allow for a finer description of the degrees of coma. Each response is scored separately and a total is derived from E+M+V, with a scoring range of 3 to 15 points.

Sum of Patient's Responses*	Degree of Severity (%)
13 - 15	Mild
9 - 12	Moderate
3 - 8	Severe

* Best to score within 24 hours after injury (Teasdale & Jessnett, 1974). While the GCS is useful to define the severity of the injury and distinguish between patients with indices of 3 versus 15, it does not necessarily follow that the long range outcomes of these two groups will differ significantly (Rimel, Giordani, Barth, Boll, Jane, 1981).

It is important to note the differences between the Glasgow Coma Scale and the Rancho Levels of Cognitive Functioning Scale (NHIF,1983). The Glasgow Scale is used to determine **levels of consciousness,** while the Rancho Scale measures post injury **behavioral** responses.

RANCHO LEVELS OF COGNITIVE FUNCTIONING

Measures of Cognitive Functioning in the Rehabilitation Facility

The levels of cognitive functioning scale* developed by the head injury treatment team at the Rancho Los Amigos Hospital in California is very useful both to therapists and to families to help understand the behavior of each individual as he goes through rehabilitation (Hagen, Malkmus, Durham, 1981). These levels apply specifically to head-injured people in the first weeks or months following injury and should not be used years later as a gauge of improvement. Initially, progress will be rapid and you will notice the student moving from Level II to Level IV and V. As the months go by, progress slows, and at some point the individual will seem to "plateau" perhaps at Level VI or VII. The level at which this will happen cannot be predicted ahead of time. The Rancho Levels reproduced as follows are severely shortened but still provide some insight into the expected progression during rehabilitation.

I. **NO RESPONSE:** Unresponsive to any stimulus.

II. **GENERALIZED RESPONSE:** Limited, inconsistent, nonpurposive responses, often to pain only.

III. **LOCALIZED RESPONSE:** Purposeful responses; may follow simple commands; may focus on presented object.

IV. **CONFUSED AGITATED:** Heightened state of activity; confusion, disorientation; aggressive behavior; unable to do self-care; unaware of present events; agitation appears related to internal confusion.

V. **CONFUSED, INAPPROPRIATE, NONAGITATED:** Appears alert; responds to commands; distractible; does not concentrate on tasks; agitated responses to external stimuli; verbally inappropriate; does not learn new information.

VI. **CONFUSED APPROPRIATE:** Good directed behavior, needs cueing; can relearn old skills as Activities of Daily Living (ADL); serious memory problems; some awareness of self and others.

VII. **AUTOMATIC APPROPRIATE:** Robot-like appropriate behavior, minimal confusion; shallow recall; poor insight into condition; initiates tasks but needs structure; poor judgement, problem-solving and planning skills.

VIII. **PURPOSEFUL APPROPRIATE:** Alert, oriented; recalls and integrates past events; learns new activities and can continue without supervision; independent in home and living skills; capable of driving; defects in stress tolerance, judgement, abstract reasoning persist; may function at reduced levels in society.

Cognitive Treatment Techniques
(Using the Cognitive Functioning Scale)

The following suggestions for intervention are adapted from Hage (1984).

Levels I, II & III

Goal: Activate response

Facilitation:

1. Remain calm and soothing in all verbal and physical contact.
2. Talk about familiar subjects, i.e., explain to patient about things the family is involved in, amusing things that happened in the family. However, limit the amount of conversation.
3. Always assume everything you say is understood and do not carry on conversations with others while interacting with the patient. Even though a person is unable to respond, that does not mean they do not hear.
4. Use auditory, visual or tactile stimulation in brief presentations to elicit responses; but remember that too much stimulation can result in decreased awareness due to habituation. Interactions should be limited to less than 15 minutes.
5. The best responses are usually noted with family and significant others.

Level IV

Goal: Decrease agitation and increase awareness

Facilitation:

1. Using a calm manner, soft speech and slow movements, there is less of a tendency to trigger agitation.
2. Keep stimulation (auditory, visual, and tactile) to a minimum and restricted to one sensory modality at a time as much as possible. When talking to the patient, turn off the radio or TV.
3. Prepare the patient by briefly describing what you are about to do.

4. If agitation is ongoing, do not try to rationalize with the patient, but rather allow time to readjust.

5. Do not take the agitated behavior or inappropriate comments personally.

Levels V & VI

Goal: Purposeful and appropriate responses

Facilitation:

1. Continue to use a calm soothing manner while remembering to address the patient as an adult.

2. Give instructions/information in shorter quantities, and be sure the patient is paying attention to your instructions. The patient's attention will easily wander.

3. Try to maintain a consistent routine of activities to help the patient become more organized in thought. Keep the patient structured in mentally challenging, although not frustrating, activities.

4. Remember that as a patients becomes more aware of their situation, they may become more irritable, uncooperative or withdrawn.

Levels VII & VIII

Goal: Increased ability to perform activities of Daily Living with little or no direct supervision

Facilitation:

1. Keep schedules of expected daily activities where the patient can easily locate and read.

2. Have the patient keep a diary of daily activities with a specific area for reminders of "things that need to be done."

3. Encourage participation in familiar social activities.

4. Allow the patient to assume some appropriate household responsibilities.

GILLETTE SCALE: PATIENTS FIVE YEARS AND OLDER

Levels of Consciousness

This scale was developed primarily for use with children. Caution must be used in reading the scale, as it is in inverse order when compared to the Glasgow scale. A higher value on the Gillette scale is a worse condition, while on the Glasgow scale it is a better condition.

Level 5:	No Response to Stimuli	Patient as presents in emergency room
Level 4:	Generalized Response to Sensory Stimuli	Response to pain: Reflex withdrawal Facial grimace Sound response before visual response
Level 3:	Localized Response to Sensory Stimuli	Visual - Blinks at light or a threat, then eyes follow - More optimistic outcome, especially if displaying visual responses Movement of extremities - Localized response

Official End of Comatose Period

Level 2:	Responsive to Environment	Purposeful activity Following commands - Uses gestures as well as verbal
Level 1:	Oriented to Self and Surroundings	Oriented to time and place Reintegration into home, school and community
Level 0:	Return to Preaccident Status	

This scale was adapted from Rancho Los Amigos Hospital, Downy, California by Gillette Children's Hospital for use with children.

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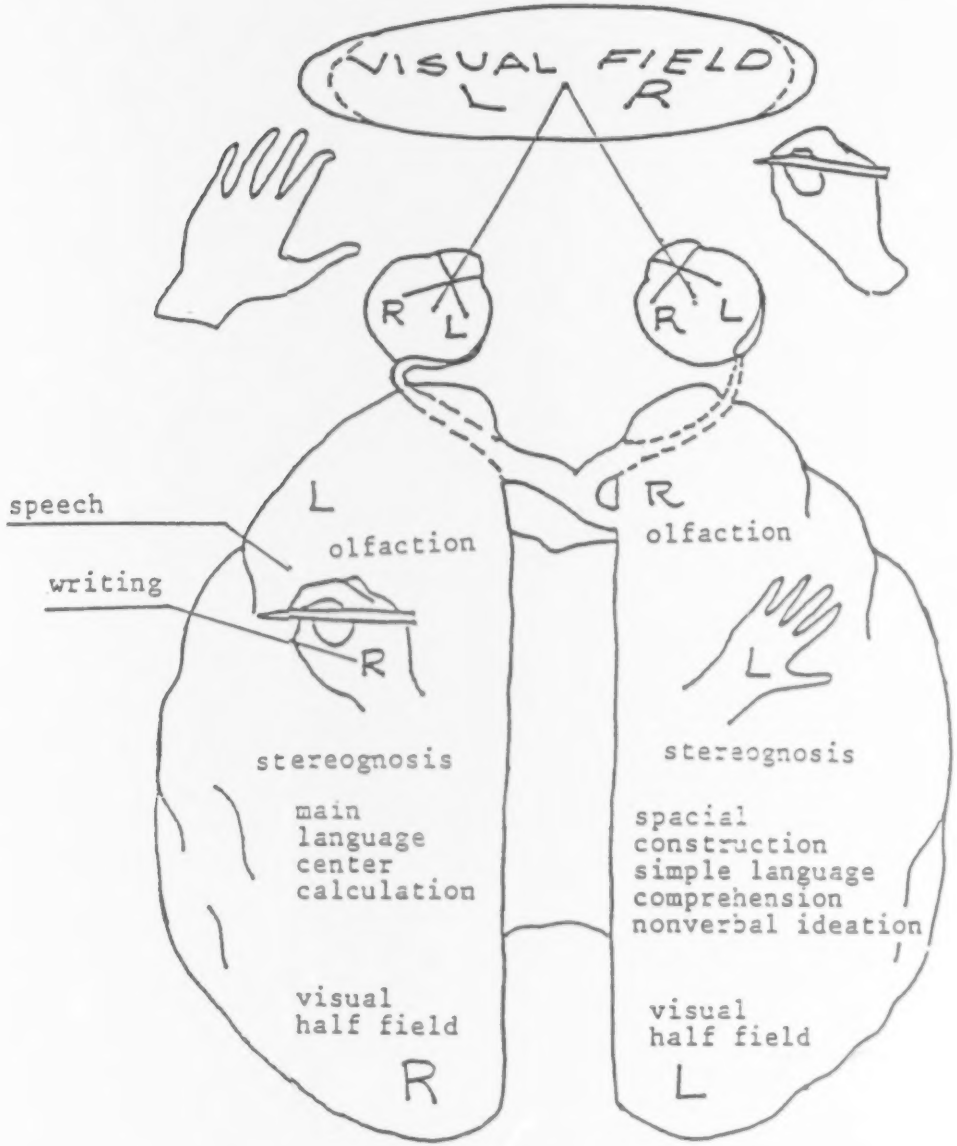
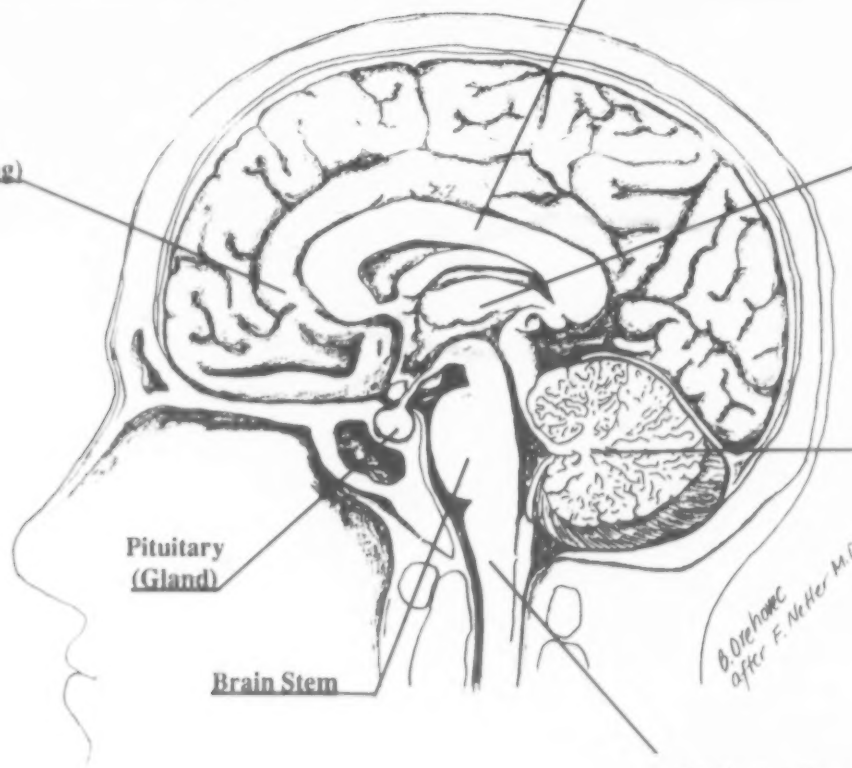


Drawing compliments of Children's Head Injury Program
Emanuel Hospital and Health Center

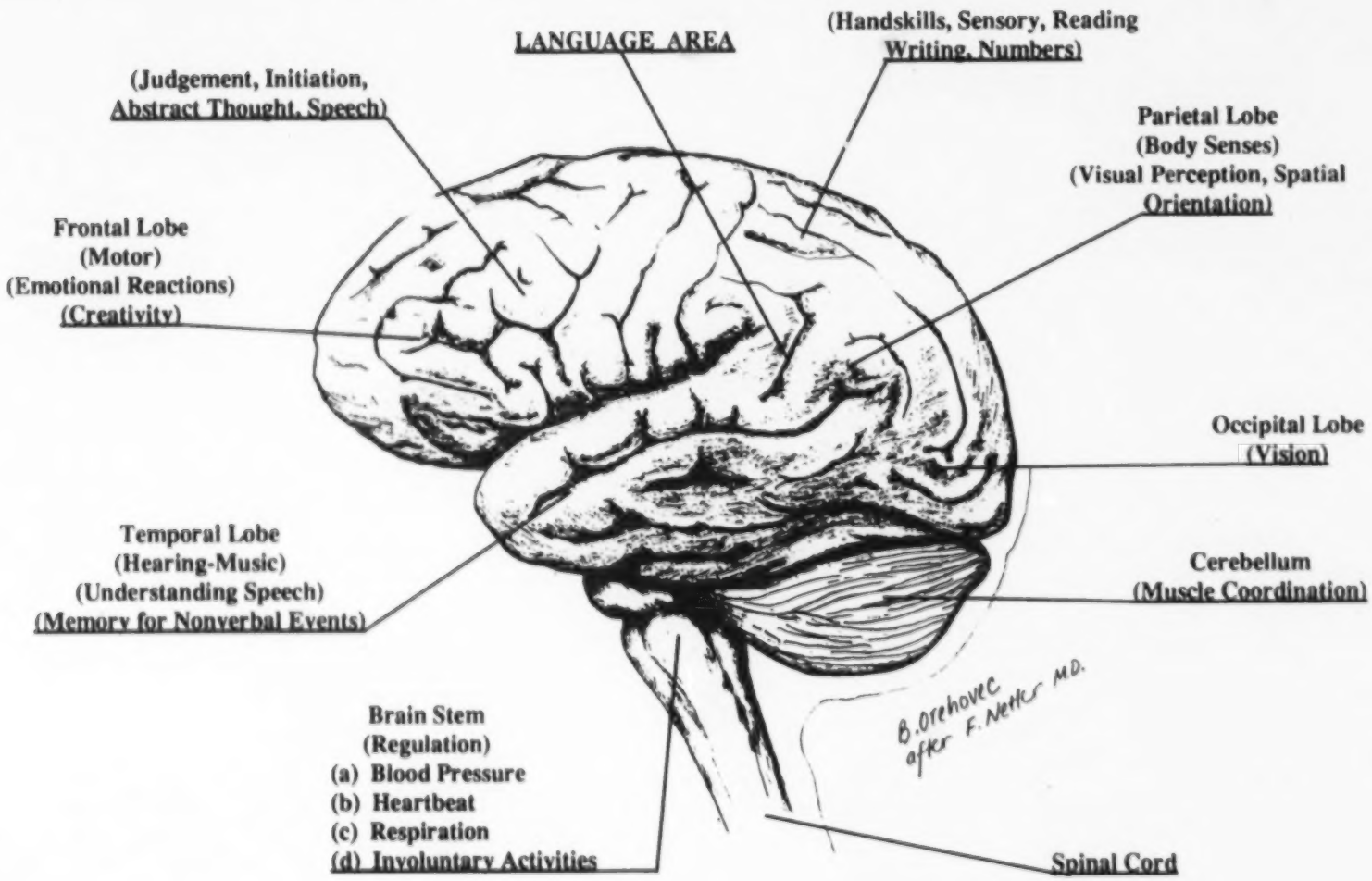
MIDLINE VIEW

The Cerebral Cortex with its major functional areas.



Drawing compliments of Children's Head Injury Program
Emanuel Hospital and Health Center

BRAIN SURFACE



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